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<110> DRUILHE, PIERRE
DAUBERSIES, PIERRE

<120> MALARIAL PRE-ERYTHROCYTIC STAGE POLYPEPTIDE MOLECULES

<130> 0660-0125-0 PCT

<140> 08/973,462

<141> 1998-02-06

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595

600

605

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| Pro | Ser | Val | Glu | Glu | Ser | Val | Ala | Pro | Ser | Val | Glu | Glu | Ser | Val | Ala | |
| | | | 805 | | | | | | 810 | | | | | 815 | | |
| gaa | aac | gtt | gca | aca | aat | tta | tca | gac | aat | ctt | tta | agt | aat | tta | tta | 2496 |
| Glu | Asn | Val | Ala | Thr | Asn | Leu | Ser | Asp | Asn | Leu | Leu | Ser | Asn | Leu | Leu | |
| | | | 820 | | | | | 825 | | | | | 830 | | | |
| ggt | ggt | atc | gaa | act | gag | gaa | ata | aag | gac | agt | ata | tta | aat | gag | ata | 2544 |
| Gly | Gly | Ile | Glu | Thr | Glu | Glu | Ile | Lys | Asp | Ser | Ile | Leu | Asn | Glu | Ile | |
| | | 835 | | | | | 840 | | | | | 845 | | | | |
| gaa | gaa | gta | aaa | gaa | aat | gta | gtc | acc | aca | ata | cta | gaa | aac | gta | gaa | 2592 |
| Glu | Glu | Val | Lys | Glu | Asn | Val | Val | Thr | Thr | Ile | Leu | Glu | Asn | Val | Glu | |
| | | 850 | | | | 855 | | | | | 860 | | | | | |
| gaa | act | aca | gct | gaa | agt | gta | act | act | ttt | agt | aac | ata | tta | gag | gag | 2640 |
| Glu | Thr | Thr | Ala | Glu | Ser | Val | Thr | Thr | Phe | Ser | Asn | Ile | Leu | Glu | Glu | |
| 865 | | | | | 870 | | | | 875 | | | | | 880 | | |
| ata | caa | gaa | aat | act | att | act | aat | gat | act | ata | gag | gaa | aaa | tta | gaa | 2688 |
| Ile | Gln | Glu | Asn | Thr | Ile | Thr | Asn | Asp | Thr | Ile | Glu | Glu | Lys | Leu | Glu | |
| | | | 885 | | | | | 890 | | | | | | 895 | | |
| gaa | ctc | cac | gaa | aat | gta | tta | agt | gcc | gct | tta | gaa | aat | acc | caa | agt | 2736 |
| Glu | Leu | His | Glu | Asn | Val | Leu | Ser | Ala | Ala | Leu | Glu | Asn | Thr | Gln | Ser | |
| | | | 900 | | | | | 905 | | | | | 910 | | | |
| gaa | gag | gaa | aag | aaa | gaa | gta | ata | gat | gta | att | gaa | gaa | gta | aaa | gaa | 2784 |
| Glu | Glu | Glu | Lys | Lys | Glu | Val | Ile | Asp | Val | Ile | Glu | Glu | Val | Lys | Glu | |
| | | 915 | | | | | 920 | | | | 925 | | | | | |
| gag | gtc | gct | acc | act | tta | ata | gaa | act | gtg | gaa | cag | gca | gaa | gaa | aag | 2832 |
| Glu | Val | Ala | Thr | Thr | Leu | Ile | Glu | Thr | Val | Glu | Gln | Ala | Glu | Glu | Lys | |
| | 930 | | | | | 935 | | | | | 940 | | | | | |
| agc | gca | aat | aca | att | acg | gaa | ata | ttt | gaa | aat | tta | gaa | gaa | aat | gca | 2880 |
| Ser | Ala | Asn | Thr | Ile | Thr | Glu | Ile | Phe | Glu | Asn | Leu | Glu | Glu | Asn | Ala | |
| 945 | | | | | 950 | | | | 955 | | | | | 960 | | |
| gta | gaa | agt | aat | gaa | aat | gtt | gca | gag | aat | tta | gag | aaa | tta | aac | gaa | 2928 |
| Val | Glu | Ser | Asn | Glu | Asn | Val | Ala | Glu | Asn | Leu | Glu | Lys | Leu | Asn | Glu | |
| | | | 965 | | | | | 970 | | | | | 975 | | | |
| act | gta | ttt | aat | act | gta | tta | gat | aaa | gta | gag | gaa | aca | gta | gaa | att | 2976 |
| Thr | Val | Phe | Asn | Thr | Val | Leu | Asp | Lys | Val | Glu | Glu | Thr | Val | Glu | Ile | |
| | | | 980 | | | | 985 | | | | | 990 | | | | |
| agc | gga | gaa | agt | tta | gaa | aac | aat | gaa | atg | gat | aaa | gca | ttt | ttt | agt | 3024 |

| | | | | | | | | | | | | | | | | | |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
| Ser | Gly | Glu | Ser | Leu | Glu | Asn | Asn | Glu | Met | Asp | Lys | Ala | Phe | Phe | Ser | | |
| | | 995 | | | | | 1000 | | | | | 1005 | | | | | |
| gaa | ata | ttt | gat | aat | gta | aaa | gga | ata | caa | gaa | aat | tta | tta | aca | ggt | 3072 | |
| Glu | Ile | Phe | Asp | Asn | Val | Lys | Gly | Ile | Gln | Glu | Asn | Leu | Leu | Thr | Gly | | |
| | 1010 | | | | | 1015 | | | | | 1020 | | | | | | |
| atg | ttt | cga | agt | ata | gaa | acc | agt | ata | gta | atc | caa | tca | gaa | gaa | aag | 3120 | |
| Met | Phe | Arg | Ser | Ile | Glu | Thr | Ser | Ile | Val | Ile | Gln | Ser | Glu | Glu | Lys | | |
| | 1025 | | | | 1030 | | | | | 1035 | | | | | 1040 | | |
| gtt | gat | ttg | aat | gaa | aat | gtg | gtt | agt | tcg | att | tta | gat | aat | ata | gaa | 3168 | |
| Val | Asp | Leu | Asn | Glu | Asn | Val | Val | Ser | Ser | Ile | Leu | Asp | Asn | Ile | Glu | | |
| | | | | 1045 | | | | | 1050 | | | | | | 1055 | | |
| aat | atg | aaa | gaa | ggt | tta | tta | aat | aaa | tta | gaa | aat | att | tca | agt | act | 3216 | |
| Asn | Met | Lys | Glu | Gly | Leu | Leu | Asn | Lys | Leu | Glu | Asn | Ile | Ser | Ser | Thr | | |
| | | 1060 | | | | | | 1065 | | | | | 1070 | | | | |
| gaa | ggt | ggt | caa | gaa | act | gta | act | gaa | cat | gta | gaa | caa | aat | gta | tat | 3264 | |
| Glu | Gly | Val | Gln | Glu | Thr | Val | Thr | Glu | His | Val | Glu | Gln | Asn | Val | Tyr | | |
| | 1075 | | | | | | 1080 | | | | | 1085 | | | | | |
| gtg | gat | ggt | gat | ggt | cct | gct | atg | aaa | gat | caa | ttt | tta | gga | ata | tta | 3312 | |
| Val | Asp | Val | Asp | Val | Pro | Ala | Met | Lys | Asp | Gln | Phe | Leu | Gly | Ile | Leu | | |
| | 1090 | | | | | 1095 | | | | | 1100 | | | | | | |
| aat | gag | gca | gga | ggg | ttg | aaa | gaa | atg | ttt | ttt | aat | ttg | gaa | gat | gta | 3360 | |
| Asn | Glu | Ala | Gly | Gly | Leu | Lys | Glu | Met | Phe | Phe | Asn | Leu | Glu | Asp | Val | | |
| | 1105 | | | | 1110 | | | | | 1115 | | | | | 1120 | | |
| ttt | aaa | agt | gaa | agt | gat | gta | att | act | gta | gaa | gaa | att | aag | gat | gaa | 3408 | |
| Phe | Lys | Ser | Glu | Ser | Asp | Val | Ile | Thr | Val | Glu | Glu | Ile | Lys | Asp | Glu | | |
| | | | | 1125 | | | | | 1130 | | | | | 1135 | | | |
| ccg | ggt | caa | aaa | gag | gta | gaa | aaa | gaa | act | ggt | agt | att | att | gaa | gaa | 3456 | |
| Pro | Val | Gln | Lys | Glu | Val | Glu | Lys | Glu | Thr | Val | Ser | Ile | Ile | Glu | Glu | | |
| | | | 1140 | | | | | 1145 | | | | | 1150 | | | | |
| atg | gaa | gaa | aat | att | gta | gat | gta | tta | gag | gaa | gaa | aaa | gaa | gat | tta | 3504 | |
| Met | Glu | Glu | Asn | Ile | Val | Asp | Val | Leu | Glu | Glu | Glu | Lys | Glu | Asp | Leu | | |
| | 1155 | | | | | | 1160 | | | | | | 1165 | | | | |
| aca | gac | aag | atg | ata | gat | gca | gta | gaa | gaa | tcc | ata | gaa | ata | tct | tca | 3552 | |
| Thr | Asp | Lys | Met | Ile | Asp | Ala | Val | Glu | Glu | Ser | Ile | Glu | Ile | Ser | Ser | | |
| | 1170 | | | | | 1175 | | | | | 1180 | | | | | | |
| gat | tct | aaa | gaa | gaa | act | gaa | tct | att | aaa | gat | aaa | gaa | aaa | gat | gtt | 3600 | |
| Asp | Ser | Lys | Glu | Glu | Thr | Glu | Ser | Ile | Lys | Asp | Lys | Glu | Lys | Asp | Val | | |

| 1185 | 1190 | 1195 | 1200 | |
|---|------|------|------|------|
| tca cta gtt gtt gaa gaa gtt caa gac aat gat atg gat gaa agt gtt | | | | 3648 |
| Ser Leu Val Val Glu Glu Val Gln Asp Asn Asp Met Asp Glu Ser Val | | | | |
| 1205 | 1210 | 1215 | | |
| gag aaa gtt tta gaa ttg aaa aat atg gaa gag gag tta atg aag gat | | | | 3696 |
| Glu Lys Val Leu Glu Leu Lys Asn Met Glu Glu Glu Leu Met Lys Asp | | | | |
| 1220 | 1225 | 1230 | | |
| gct gtt gaa ata aat gac att act agc aaa ctt att gaa gaa act caa | | | | 3744 |
| Ala Val Glu Ile Asn Asp Ile Thr Ser Lys Leu Ile Glu Glu Thr Gln | | | | |
| 1235 | 1240 | 1245 | | |
| gag tta aat gaa gta gaa gca gat tta ata aaa gat atg gaa aaa tta | | | | 3792 |
| Glu Leu Asn Glu Val Glu Ala Asp Leu Ile Lys Asp Met Glu Lys Leu | | | | |
| 1250 | 1255 | 1260 | | |
| aaa gaa tta gaa aaa gca tta tca gaa gat tct aaa gaa ata ata gat | | | | 3840 |
| Lys Glu Leu Glu Lys Ala Leu Ser Glu Asp Ser Lys Glu Ile Ile Asp | | | | |
| 1265 | 1270 | 1275 | 1280 | |
| gca aaa gat gat aca tta gaa aaa gtt att gaa gag gaa cat gat ata | | | | 3888 |
| Ala Lys Asp Asp Thr Leu Glu Lys Val Ile Glu Glu Glu His Asp Ile | | | | |
| 1285 | 1290 | 1295 | | |
| acg acg acg ttg gat gaa gtt gta gaa tta aaa gat gtc gaa gaa gac | | | | 3936 |
| Thr Thr Thr Leu Asp Glu Val Val Glu Leu Lys Asp Val Glu Glu Asp | | | | |
| 1300 | 1305 | 1310 | | |
| aag atc gaa aaa gta tct gat tta aaa gat ctt gaa gaa gat ata tta | | | | 3984 |
| Lys Ile Glu Lys Val Ser Asp Leu Lys Asp Leu Glu Glu Asp Ile Leu | | | | |
| 1315 | 1320 | 1325 | | |
| aaa gaa gta aaa gaa atc aaa gaa ctt gaa agt gaa att tta gaa gat | | | | 4032 |
| Lys Glu Val Lys Glu Ile Lys Glu Leu Glu Ser Glu Ile Leu Glu Asp | | | | |
| 1330 | 1335 | 1340 | | |
| tat aaa gaa tta aaa act att gaa aca gat att tta gaa gag aaa aaa | | | | 4080 |
| Tyr Lys Glu Leu Lys Thr Ile Glu Thr Asp Ile Leu Glu Glu Lys Lys | | | | |
| 1345 | 1350 | 1355 | 1360 | |
| gaa ata gaa aaa gat cat ttt gaa aaa ttc gaa gaa gaa gct gaa gaa | | | | 4128 |
| Glu Ile Glu Lys Asp His Phe Glu Lys Phe Glu Glu Glu Ala Glu Glu | | | | |
| 1365 | 1370 | 1375 | | |
| ata aaa gat ctt gaa gca gat ata tta aaa gaa gta tct tca tta gaa | | | | 4176 |
| Ile Lys Asp Leu Glu Ala Asp Ile Leu Lys Glu Val Ser Ser Leu Glu | | | | |
| 1380 | 1385 | 1390 | | |

| | |
|--|------|
| gtt gaa gaa gaa aaa aaa tta gaa gaa gta cac gaa tta aaa gaa gag | 4224 |
| Val [*] Glu Glu Glu Lys Lys Leu Glu Glu Val His Glu Leu Lys Glu Glu | |
| 1395 1400 1405 | |
| gta gaa cat ata ata agt ggt gat gcg cat ata aaa ggt ttg gaa gaa | 4272 |
| Val Glu His Ile Ile Ser Gly Asp Ala His Ile Lys Gly Leu Glu Glu | |
| 1410 1415 1420 | |
| gat gat tta gaa gaa gta gat gat tta aaa gga agt ata tta gac atg | 4320 |
| Asp Asp Leu Glu Glu Val Asp Asp Leu Lys Gly Ser Ile Leu Asp Met | |
| 1425 1430 1435 1440 | |
| tta aag gga gat atg gaa tta ggg gat atg gat aag gaa agt tta gaa | 4368 |
| Leu Lys Gly Asp Met Glu Leu Gly Asp Met Asp Lys Glu Ser Leu Glu | |
| 1445 1450 1455 | |
| gat gta aca aca aaa ctt gga gaa aga gtt gaa tcc tta aaa gat gtt | 4416 |
| Asp Val Thr Thr Lys Leu Gly Glu Arg Val Glu Ser Leu Lys Asp Val | |
| 1460 1465 1470 | |
| tta tct agt gca tta ggc atg gat gaa gaa caa atg aaa aca aga aaa | 4464 |
| Leu Ser Ser Ala Leu Gly Met Asp Glu Glu Gln Met Lys Thr Arg Lys | |
| 1475 1480 1485 | |
| aaa gct caa aga cct aag ttg gaa gaa gta tta tta aaa gaa gag gtt | 4512 |
| Lys Ala Gln Arg Pro Lys Leu Glu Glu Val Leu Leu Lys Glu Glu Val | |
| 1490 1495 1500 | |
| aaa gaa gaa cca aag aaa aaa ata aca aaa aag aaa gta agg ttt gat | 4560 |
| Lys Glu Glu Pro Lys Lys Lys Ile Thr Lys Lys Lys Val Arg Phe Asp | |
| 1505 1510 1515 1520 | |
| att aag gat aag gaa cca aaa gat gaa ata gta gaa gtt gaa atg aaa | 4608 |
| Ile Lys Asp Lys Glu Pro Lys Asp Glu Ile Val Glu Val Glu Met Lys | |
| 1525 1530 1535 | |
| gat gaa gat ata gaa gaa gat gta gaa gaa gat ata gaa gaa gat ata | 4656 |
| Asp Glu Asp Ile Glu Glu Asp Val Glu Glu Asp Ile Glu Glu Asp Ile | |
| 1540 1545 1550 | |
| gaa gaa gat aaa gtt gaa gat ata gat gaa gat ata gat gaa gat ata | 4704 |
| Glu Glu Asp Lys Val Glu Asp Ile Asp Glu Asp Ile Asp Glu Asp Ile | |
| 1555 1560 1565 | |
| ggt gaa gac aaa gat gaa gtt ata gat tta ata gtc caa aaa gag aaa | 4752 |
| Gly Glu Asp Lys Asp Glu Val Ile Asp Leu Ile Val Gln Lys Glu Lys | |
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1780

1785

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 1 5 10 15

gat ata aag gaa aat atc tta tta agt aat ata gaa gaa cca aaa gaa 97
 Asp Ile Lys Glu Asn Ile Leu Leu Ser Asn Ile Glu Glu Pro Lys Glu
 20 25 30

aat att att gac aat tta tta aat aat att gga caa aat tca gaa aaa 145
 Asn Ile Ile Asp Asn Leu Leu Asn Asn Ile Gly Gln Asn Ser Glu Lys
 35 40 45

caa gaa agt gta tca gaa aat gta caa gtc agt gat gaa ctt ttt aat 193
 Gln Glu Ser Val Ser Glu Asn Val Gln Val Ser Asp Glu Leu Phe Asn
 50 55 60

gaa tta tta aat agt gta gat gtt aat gga gaa gta aaa gaa aat att 241
 Glu Leu Leu Asn Ser Val Asp Val Asn Gly Glu Val Lys Glu Asn Ile
 65 70 75 80

ttg gag gaa agt caa gtt aat gac gat att ttt aat agt tta gta aaa 289
 Leu Glu Glu Ser Gln Val Asn Asp Asp Ile Phe Asn Ser Leu Val Lys
 85 90 95

agt gtt caa caa gaa caa caa cac aat gtt gaa gaa aaa gtt gaa gaa 337
 Ser Val Gln Gln Glu Gln Gln His Asn Val Glu Glu Lys Val Glu Glu
 100 105 110

agt gta gaa gaa aat gac gaa gaa agt gta gaa gaa aat gta gaa gaa 385
 Ser Val Glu Glu Asn Asp Glu Glu Ser Val Glu Glu Asn Val Glu Glu
 115 120 125

aat gta gaa gaa aat gac gac gga agt gta gcc tca agt gtt gaa gaa 433
 Asn Val Glu Glu Asn Asp Asp Gly Ser Val Ala Ser Ser Val Glu Glu
 130 135 140

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| agt | ata | gct | tca | agt | gtt | gat | gaa | agt | ata | gat | tca | agt | att | gaa | gaa | 481 |
| Ser | Ile | Ala | Ser | Ser | Val | Asp | Glu | Ser | Ile | Asp | Ser | Ser | Ile | Glu | Glu | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | |
| aat | gta | gct | cca | act | gtt | gaa | gaa | atc | gta | gct | cca | act | gtt | gaa | gaa | 529 |
| Asn | Val | Ala | Pro | Thr | Val | Glu | Glu | Ile | Val | Ala | Pro | Thr | Val | Glu | Glu | |
| | | | | 165 | | | | | 170 | | | | | 175 | | |
| att | gta | gct | cca | agt | gtt | gta | gaa | agt | gtg | gct | cca | agt | gtt | gaa | gaa | 577 |
| Ile | Val | Ala | Pro | Ser | Val | Val | Glu | Ser | Val | Ala | Pro | Ser | Val | Glu | Glu | |
| | | | 180 | | | | | 185 | | | | | 190 | | | |
| agt | gta | gct | cca | agt | gtt | gaa | gaa | agt | gta | gct | gaa | aat | gtt | gaa | gaa | 625 |
| Ser | Val | Ala | Pro | Ser | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |
| agt | gta | gct | gaa | aat | gtt | gaa | gaa | atc | gta | gct | cca | agt | gtt | gaa | gaa | 673 |
| Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ile | Val | Ala | Pro | Ser | Val | Glu | Glu | |
| | 210 | | | | | 215 | | | | | 220 | | | | | |
| agt | gta | gct | gaa | aat | gtt | gaa | gaa | agt | gta | gct | gaa | aat | gtt | gaa | gaa | 721 |
| Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | |
| 225 | | | | | 230 | | | | | 235 | | | | 240 | | |
| agt | gta | gct | gaa | aat | gtt | gaa | gaa | agt | gta | gct | gaa | aat | gtt | gaa | gaa | 769 |
| Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | |
| | | | | 245 | | | | | 250 | | | | | 255 | | |
| agt | gta | gct | gaa | aat | gtt | gaa | gaa | atc | gta | gct | cca | act | gtt | gaa | gaa | 817 |
| Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ile | Val | Ala | Pro | Thr | Val | Glu | Glu | |
| | | | 260 | | | | | 265 | | | | | 270 | | | |
| agt | gta | gct | cca | act | gtt | gaa | gaa | att | gta | gct | cca | act | gtt | gaa | gaa | 865 |
| Ser | Val | Ala | Pro | Thr | Val | Glu | Glu | Ile | Val | Ala | Pro | Thr | Val | Glu | Glu | |
| | | 275 | | | | | 280 | | | | | 285 | | | | |
| agt | gta | gct | cca | act | gtt | gaa | gaa | att | gta | gtt | cca | agt | gtt | gaa | gaa | 913 |
| Ser | Val | Ala | Pro | Thr | Val | Glu | Glu | Ile | Val | Val | Pro | Ser | Val | Glu | Glu | |
| | 290 | | | | | 295 | | | | | 300 | | | | | |
| agt | gta | gct | cca | agt | gtt | gaa | gaa | agt | gta | gct | gaa | aat | gtt | gaa | gaa | 961 |
| Ser | Val | Ala | Pro | Ser | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | |
| 305 | | | | | 310 | | | | | 315 | | | | 320 | | |
| agt | gta | gct | gaa | aat | gtt | gaa | gaa | agt | gta | gct | gaa | aat | gtt | gaa | gaa | 1009 |
| Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | |
| | | | | 325 | | | | | 330 | | | | | 335 | | |
| agt | gta | gct | gaa | aat | gtt | gaa | gaa | agt | gta | gct | gaa | aat | gtt | gaa | gaa | 1057 |

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|--|
| Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | | |
| | | | 340 | | | | | 345 | | | | | 350 | | | | |
| atc | gta | gct | cca | agt | gtt | gaa | gaa | atc | gta | gct | cca | act | gtt | gaa | gaa | 1105 | |
| Ile | Val | Ala | Pro | Ser | Val | Glu | Glu | Ile | Val | Ala | Pro | Thr | Val | Glu | Glu | | |
| | | 355 | | | | | 360 | | | | | 365 | | | | | |
| agt | gtt | gct | gaa | aac | gtt | gca | aca | aat | tta | tca | gac | aat | ctt | tta | agt | 1153 | |
| Ser | Val | Ala | Glu | Asn | Val | Ala | Thr | Asn | Leu | Ser | Asp | Asn | Leu | Leu | Ser | | |
| | | 370 | | | | | 375 | | | | | 380 | | | | | |
| aat | tta | tta | ggt | ggt | atc | gaa | act | gag | gaa | ata | aag | gac | agt | ata | tta | 1201 | |
| Asn | Leu | Leu | Gly | Gly | Ile | Glu | Thr | Glu | Glu | Ile | Lys | Asp | Ser | Ile | Leu | | |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 | | |
| aat | gag | ata | gaa | gaa | gta | aaa | gaa | aat | gta | gtc | acc | aca | ata | cta | gaa | 1249 | |
| Asn | Glu | Ile | Glu | Glu | Val | Lys | Glu | Asn | Val | Val | Thr | Thr | Ile | Leu | Glu | | |
| | | | | 405 | | | | | 410 | | | | | 415 | | | |
| aaa | gta | gaa | gaa | act | aca | gct | gaa | agt | gta | act | act | ttt | agt | aat | ata | 1297 | |
| Lys | Val | Glu | Glu | Thr | Thr | Ala | Glu | Ser | Val | Thr | Thr | Phe | Ser | Asn | Ile | | |
| | | | 420 | | | | | 425 | | | | | 430 | | | | |
| tta | gag | gag | ata | caa | gaa | aat | act | att | act | aat | gat | act | ata | gag | gaa | 1345 | |
| Leu | Glu | Glu | Ile | Gln | Glu | Asn | Thr | Ile | Thr | Asn | Asp | Thr | Ile | Glu | Glu | | |
| | | | 435 | | | | 440 | | | | | 445 | | | | | |
| aaa | tta | gaa | gaa | ctc | cac | gaa | aat | gta | tta | agt | gcc | gct | tta | gaa | aat | 1393 | |
| Lys | Leu | Glu | Glu | Leu | His | Glu | Asn | Val | Leu | Ser | Ala | Ala | Leu | Glu | Asn | | |
| | | | 450 | | | | 455 | | | | 460 | | | | | | |
| acc | caa | agt | gaa | gag | gaa | aag | aaa | gaa | gta | ata | gat | gta | att | gaa | gaa | 1441 | |
| Thr | Gln | Ser | Glu | Glu | Glu | Lys | Lys | Glu | Val | Ile | Asp | Val | Ile | Glu | Glu | | |
| 465 | | | | | 470 | | | | | 475 | | | | | 480 | | |
| gta | aaa | gaa | gag | gtc | gct | acc | act | tta | ata | gaa | act | gtg | gaa | cag | gca | 1489 | |
| Val | Lys | Glu | Glu | Val | Ala | Thr | Thr | Leu | Ile | Glu | Thr | Val | Glu | Gln | Ala | | |
| | | | | 485 | | | | | 490 | | | | | 495 | | | |
| gaa | gaa | gag | agc | gaa | agt | aca | att | acg | gaa | ata | ttt | gaa | aat | tta | gaa | 1537 | |
| Glu | Glu | Glu | Ser | Glu | Ser | Thr | Ile | Thr | Glu | Ile | Phe | Glu | Asn | Leu | Glu | | |
| | | | 500 | | | | | 505 | | | | | 510 | | | | |
| gaa | aat | gca | gta | gaa | agt | aat | gaa | aaa | gtt | gca | gag | aat | tta | gag | aaa | 1585 | |
| Glu | Asn | Ala | Val | Glu | Ser | Asn | Glu | Lys | Val | Ala | Glu | Asn | Leu | Glu | Lys | | |
| | | 515 | | | | | 520 | | | | | 525 | | | | | |
| tta | aac | gaa | act | gta | ttt | aat | act | gta | tta | gat | aaa | gta | gag | gaa | aca | 1633 | |
| Leu | Asn | Glu | Thr | Val | Phe | Asn | Thr | Val | Leu | Asp | Lys | Val | Glu | Glu | Thr | | |

| 530 | 535 | 540 | |
|---|-----|-----|------|
| gta gaa att agc gga gaa agt tta gaa aac aat gaa atg gat aaa gca | | | 1681 |
| Val Glu Ile Ser Gly Glu Ser Leu Glu Asn Asn Glu Met Asp Lys Ala | | | |
| 545 | 550 | 555 | 560 |
| ttt ttt agt gaa ata ttt gat aat gta aaa gga ata caa gaa aat tta | | | 1729 |
| Phe Phe Ser Glu Ile Phe Asp Asn Val Lys Gly Ile Gln Glu Asn Leu | | | |
| | 565 | 570 | 575 |
| tta aca ggt atg ttt cga agt ata gaa acc agt ata gta atc caa tca | | | 1777 |
| Leu Thr Gly Met Phe Arg Ser Ile Glu Thr Ser Ile Val Ile Gln Ser | | | |
| | 580 | 585 | 590 |
| gaa gaa aag gtt gat ttg aat gaa aat gtg gtt agt tcg att tta gat | | | 1825 |
| Glu Glu Lys Val Asp Leu Asn Glu Asn Val Val Ser Ser Ile Leu Asp | | | |
| | 595 | 600 | 605 |
| aat ata gaa aat atg aaa gaa ggt tta tta aat aaa tta gaa aat att | | | 1873 |
| Asn Ile Glu Asn Met Lys Glu Gly Leu Leu Asn Lys Leu Glu Asn Ile | | | |
| 610 | 615 | 620 | |
| tca agt act gaa ggc gaa | | | 1891 |
| Ser Ser Thr Glu Gly Glu | | | |
| 625 | 630 | | |

<210> 4
 <211> 28
 <212> DNA
 <213> Artificial Sequence
 <220>
 <223> Description of Artificial Sequence:Primer
 <400> 4
 gtgatgaact ttttaatgaa ttattaaa

28

<210> 5
 <211> 29
 <212> DNA
 <213> Artificial Sequence
 <220>
 <223> Description of Artificial Sequence:Primer
 <400> 5
 tgttggtcctt gttgaacact ttttactaa

29

<210> 6
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:Primer

<400> 6
ggtatcgaaa ctgaggaaat aaagg 25

<210> 7
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:Syntheticoligonucleotide

<400> 7
catagcagga acatcaacat ccac 24

<210> 8
<211> 1786
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:Polypeptide

<400> 8
Met Thr Asn Ser Asn Tyr Lys Ser Asn Asn Lys Thr Tyr Asn Glu Asn
1 5 10 15
Asn Asn Glu Gln Ile Thr Thr Ile Phe Asn Arg Thr Asn Met Asn Pro
20 25 30
Ile Lys Lys Cys His Met Arg Glu Lys Ile Asn Lys Tyr Phe Phe Leu
35 40 45
Ile Lys Ile Leu Thr Cys Thr Ile Leu Ile Trp Ala Val Gln Tyr Asp
50 55 60
Asn Asn Ser Asp Ile Asn Lys Ser Trp Lys Lys Asn Thr Tyr Val Asp
65 70 75 80

Lys Lys Leu Asn Lys Leu Phe Asn Arg Ser Leu Gly Glu Ser Gln Val
 85 90 95
 Asn Gly Glu Leu Ala Ser Glu Glu Val Lys Glu Lys Ile Leu Asp Leu
 100 105 110
 Leu Glu Glu Gly Asn Thr Leu Thr Glu Ser Val Asp Asp Asn Lys Asn
 115 120 125
 Leu Glu Glu Ala Glu Asp Ile Lys Glu Asn Ile Leu Leu Ser Asn Ile
 130 135 140
 Glu Glu Pro Lys Glu Asn Ile Ile Asp Asn Leu Leu Asn Asn Ile Gly
 145 150 155 160
 Gln Asn Ser Glu Lys Gln Glu Ser Val Ser Glu Asn Val Gln Val Ser
 165 170 175
 Asp Glu Leu Phe Asn Glu Leu Leu Asn Ser Val Asp Val Asn Gly Glu
 180 185 190
 Val Lys Glu Asn Ile Leu Glu Glu Ser Gln Val Asn Asp Asp Ile Phe
 195 200 205
 Asn Ser Leu Val Lys Ser Val Gln Gln Glu Gln Gln His Asn Val Glu
 210 215 220
 Glu Lys Val Glu Glu Ser Val Glu Glu Asn Asp Glu Glu Ser Val Glu
 225 230 235 240
 Glu Asn Val Glu Glu Asn Val Glu Glu Asn Asp Asp Gly Ser Val Ala
 245 250 255
 Ser Ser Val Glu Glu Ser Ile Ala Ser Ser Val Asp Glu Ser Ile Asp
 260 265 270
 Ser Ser Ile Glu Glu Asn Val Ala Pro Thr Val Glu Glu Ile Val Ala
 275 280 285
 Pro Ser Val Val Glu Ser Val Ala Pro Ser Val Glu Glu Ser Val Glu
 290 295 300
 Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala
 305 310 315 320
 Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala
 325 330 335
 Glu Asn Val Glu Glu Ile Val Ala Pro Thr Val Glu Glu Ile Val Ala

| | | | | | |
|---|-----|-----|-----|-----|-----|
| | 340 | | 345 | | 350 |
| Pro Thr Val Glu Glu Ile Val Ala Pro Ser Val Val Glu Ser Val Ala | 355 | | 360 | | 365 |
| Pro Ser Val Glu Glu Ser Val Glu Glu Asn Val Glu Glu Ser Val Ala | 370 | | 375 | | 380 |
| Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala | 385 | | 390 | | 395 |
| Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala | | 405 | | 410 | 415 |
| Glu Asn Val Glu Glu Ile Val Ala Pro Thr Val Glu Glu Ile Val Ala | | 420 | | 425 | 430 |
| Pro Thr Val Glu Glu Ile Val Ala Pro Ser Val Val Glu Ser Val Ala | | 435 | | 440 | 445 |
| Pro Ser Val Glu Glu Ser Val Glu Glu Asn Val Glu Glu Ser Val Ala | | 450 | | 455 | 460 |
| Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala | | 465 | | 470 | 475 |
| Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala | | 485 | | 490 | 495 |
| Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala | | 500 | | 505 | 510 |
| Glu Asn Val Glu Glu Ile Val Ala Pro Thr Val Glu Glu Ile Val Ala | | 515 | | 520 | 525 |
| Pro Thr Val Glu Glu Ile Val Ala Pro Ser Val Val Glu Ser Val Ala | | 530 | | 535 | 540 |
| Pro Ser Val Glu Glu Ser Val Glu Glu Asn Val Glu Glu Ser Val Ala | | 545 | | 550 | 555 |
| Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala | | 565 | | 570 | 575 |
| Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ile Val Ala | | 580 | | 585 | 590 |
| Pro Thr Val Glu Glu Ile Val Ala Pro Thr Val Glu Glu Ile Val Ala | | 595 | | 600 | 605 |

Pro Ser Val Val Glu Ser Val Ala Pro Ser Val Glu Glu Ser Val Glu
 610 615 620
 Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala
 625 630 635 640
 Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ile Val Ala
 645 650 655
 Pro Thr Val Glu Glu Ile Val Ala Pro Thr Val Glu Glu Ile Val Ala
 660 665 670
 Pro Ser Val Val Glu Ser Val Ala Pro Ser Val Glu Glu Ser Val Glu
 675 680 685
 Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala
 690 695 700
 Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala
 705 710 715 720
 Glu Asn Val Glu Glu Ile Val Ala Pro Thr Val Glu Glu Ile Val Ala
 725 730 735
 Pro Thr Val Glu Glu Ile Val Ala Pro Ser Val Val Glu Ser Val Ala
 740 745 750
 Pro Ser Val Glu Glu Ser Val Glu Glu Asn Val Glu Glu Ser Val Ala
 755 760 765
 Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala
 770 775 780
 Glu Asn Val Glu Glu Ser Val Ala Pro Thr Val Glu Glu Ile Val Ala
 785 790 795 800
 Pro Ser Val Glu Glu Ser Val Ala Pro Ser Val Glu Glu Ser Val Ala
 805 810 815
 Glu Asn Val Ala Thr Asn Leu Ser Asp Asn Leu Leu Ser Asn Leu Leu
 820 825 830
 Gly Gly Ile Glu Thr Glu Glu Ile Lys Asp Ser Ile Leu Asn Glu Ile
 835 840 845
 Glu Glu Val Lys Glu Asn Val Val Thr Thr Ile Leu Glu Asn Val Glu
 850 855 860
 Glu Thr Thr Ala Glu Ser Val Thr Thr Phe Ser Asn Ile Leu Glu Glu

| | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|
| 865 | | 870 | | 875 | | 880 | | | | | | | | | |
| Ile | Gln | Glu | Asn | Thr | Ile | Thr | Asn | Asp | Thr | Ile | Glu | Glu | Lys | Leu | Glu |
| | | | 885 | | | | | | 890 | | | | | 895 | |
| Glu | Leu | His | Glu | Asn | Val | Leu | Ser | Ala | Ala | Leu | Glu | Asn | Thr | Gln | Ser |
| | | | 900 | | | | | 905 | | | | | 910 | | |
| Glu | Glu | Glu | Lys | Lys | Glu | Val | Ile | Asp | Val | Ile | Glu | Glu | Val | Lys | Glu |
| | | | 915 | | | | 920 | | | | | 925 | | | |
| Glu | Val | Ala | Thr | Thr | Leu | Ile | Glu | Thr | Val | Glu | Gln | Ala | Glu | Glu | Lys |
| | 930 | | | | | 935 | | | | | 940 | | | | |
| Ser | Ala | Asn | Thr | Ile | Thr | Glu | Ile | Phe | Glu | Asn | Leu | Glu | Glu | Asn | Ala |
| 945 | | | | | 950 | | | | | 955 | | | | | 960 |
| Val | Glu | Ser | Asn | Glu | Asn | Val | Ala | Glu | Asn | Leu | Glu | Lys | Leu | Asn | Glu |
| | | | 965 | | | | | | 970 | | | | | 975 | |
| Thr | Val | Phe | Asn | Thr | Val | Leu | Asp | Lys | Val | Glu | Glu | Thr | Val | Glu | Ile |
| | | | 980 | | | | | 985 | | | | | 990 | | |
| Ser | Gly | Glu | Ser | Leu | Glu | Asn | Asn | Glu | Met | Asp | Lys | Ala | Phe | Phe | Ser |
| | | 995 | | | | 1000 | | | | | | 1005 | | | |
| Glu | Ile | Phe | Asp | Asn | Val | Lys | Gly | Ile | Gln | Glu | Asn | Leu | Leu | Thr | Gly |
| | 1010 | | | | | 1015 | | | | | 1020 | | | | |
| Met | Phe | Arg | Ser | Ile | Glu | Thr | Ser | Ile | Val | Ile | Gln | Ser | Glu | Glu | Lys |
| 1025 | | | | 1030 | | | | | 1035 | | | | | 1040 | |
| Val | Asp | Leu | Asn | Glu | Asn | Val | Val | Ser | Ser | Ile | Leu | Asp | Asn | Ile | Glu |
| | | | 1045 | | | | | 1050 | | | | | 1055 | | |
| Asn | Met | Lys | Glu | Gly | Leu | Leu | Asn | Lys | Leu | Glu | Asn | Ile | Ser | Ser | Thr |
| | | 1060 | | | | | 1065 | | | | | 1070 | | | |
| Glu | Gly | Val | Gln | Glu | Thr | Val | Thr | Glu | His | Val | Glu | Gln | Asn | Val | Tyr |
| | 1075 | | | | | 1080 | | | | 1085 | | | | | |
| Val | Asp | Val | Asp | Val | Pro | Ala | Met | Lys | Asp | Gln | Phe | Leu | Gly | Ile | Leu |
| | 1090 | | | | 1095 | | | | | 1100 | | | | | |
| Asn | Glu | Ala | Gly | Gly | Leu | Lys | Glu | Met | Phe | Phe | Asn | Leu | Glu | Asp | Val |
| 1105 | | | | 1110 | | | | 1115 | | | | | 1120 | | |
| Phe | Lys | Ser | Glu | Ser | Asp | Val | Ile | Thr | Val | Glu | Glu | Ile | Lys | Asp | Glu |
| | | | 1125 | | | | 1130 | | | | | 1135 | | | |

Pro Val Gln Lys Glu Val Glu Lys Glu Thr Val Ser Ile Ile Glu Glu
1140 1145 1150

Met Glu Glu Asn Ile Val Asp Val Leu Glu Glu Glu Lys Glu Asp Leu
1155 1160 1165

Thr Asp Lys Met Ile Asp Ala Val Glu Glu Ser Ile Glu Ile Ser Ser
1170 1175 1180

Asp Ser Lys Glu Glu Thr Glu Ser Ile Lys Asp Lys Glu Lys Asp Val
1185 1190 1195 1200

Ser Leu Val Val Glu Glu Val Gln Asp Asn Asp Met Asp Glu Ser Val
1205 1210 1215

Glu Lys Val Leu Glu Leu Lys Asn Met Glu Glu Glu Leu Met Lys Asp
1220 1225 1230

Ala Val Glu Ile Asn Asp Ile Thr Ser Lys Leu Ile Glu Glu Thr Gln
1235 1240 1245

Glu Leu Asn Glu Val Glu Ala Asp Leu Ile Lys Asp Met Glu Lys Leu
1250 1255 1260

Lys Glu Leu Glu Lys Ala Leu Ser Glu Asp Ser Lys Glu Ile Ile Asp
1265 1270 1275 1280

Ala Lys Asp Asp Thr Leu Glu Lys Val Ile Glu Glu Glu His Asp Ile
1285 1290 1295

Thr Thr Thr Leu Asp Glu Val Val Glu Leu Lys Asp Val Glu Glu Asp
1300 1305 1310

Lys Ile Glu Lys Val Ser Asp Leu Lys Asp Leu Glu Glu Asp Ile Leu
1315 1320 1325

Lys Glu Val Lys Glu Ile Lys Glu Leu Glu Ser Glu Ile Leu Glu Asp
1330 1335 1340

Tyr Lys Glu Leu Lys Thr Ile Glu Thr Asp Ile Leu Glu Glu Lys Lys
1345 1350 1355 1360

Glu Ile Glu Lys Asp His Phe Glu Lys Phe Glu Glu Glu Ala Glu Glu
1365 1370 1375

Ile Lys Asp Leu Glu Ala Asp Ile Leu Lys Glu Val Ser Ser Leu Glu
1380 1385 1390

Val Glu Glu Glu Lys Lys Leu Glu Glu Val His Glu Leu Lys Glu Glu

1395

1400

1405

Val Glu His Ile Ile Ser Gly Asp Ala His Ile Lys Gly Leu Glu Glu
 1410 1415 1420

Asp Asp Leu Glu Glu Val Asp Asp Leu Lys Gly Ser Ile Leu Asp Met
 1425 1430 1435 1440

Leu Lys Gly Asp Met Glu Leu Gly Asp Met Asp Lys Glu Ser Leu Glu
 1445 1450 1455

Asp Val Thr Thr Lys Leu Gly Glu Arg Val Glu Ser Leu Lys Asp Val
 1460 1465 1470

Leu Ser Ser Ala Leu Gly Met Asp Glu Glu Gln Met Lys Thr Arg Lys
 1475 1480 1485

Lys Ala Gln Arg Pro Lys Leu Glu Glu Val Leu Leu Lys Glu Glu Val
 1490 1495 1500

Lys Glu Glu Pro Lys Lys Lys Ile Thr Lys Lys Lys Val Arg Phe Asp
 1505 1510 1515 1520

Ile Lys Asp Lys Glu Pro Lys Asp Glu Ile Val Glu Val Glu Met Lys
 1525 1530 1535

Asp Glu Asp Ile Glu Glu Asp Val Glu Glu Asp Ile Glu Glu Asp Ile
 1540 1545 1550

Glu Glu Asp Lys Val Glu Asp Ile Asp Glu Asp Ile Asp Glu Asp Ile
 1555 1560 1565

Gly Glu Asp Lys Asp Glu Val Ile Asp Leu Ile Val Gln Lys Glu Lys
 1570 1575 1580

Arg Ile Glu Lys Val Lys Ala Lys Lys Lys Lys Leu Glu Lys Lys Val
 1585 1590 1595 1600

Glu Glu Gly Val Ser Gly Leu Lys Lys His Val Asp Glu Val Met Lys
 1605 1610 1615

Tyr Val Gln Lys Ile Asp Lys Glu Val Asp Lys Glu Val Ser Lys Ala
 1620 1625 1630

Leu Glu Ser Lys Asn Asp Val Thr Asn Val Leu Lys Gln Asn Gln Asp
 1635 1640 1645

Phe Phe Ser Lys Val Lys Asn Phe Val Lys Lys Tyr Lys Val Phe Ala
 1650 1655 1660

Ala Pro Phe Ile Ser Ala Val Ala Ala Phe Ala Ser Tyr Val Val Gly
 1665 1670 1675 1680

Phe Phe Thr Phe Ser Leu Phe Ser Ser Cys Val Thr Ile Ala Ser Ser
 1685 1690 1695

Thr Tyr Leu Leu Ser Lys Val Asp Lys Thr Ile Asn Lys Asn Lys Glu
 1700 1705 1710

Arg Pro Phe Tyr Ser Phe Val Phe Asp Ile Phe Lys Asn Leu Lys His
 1715 1720 1725

Tyr Leu Gln Gln Met Lys Glu Lys Phe Ser Lys Glu Lys Asn Asn Asn
 1730 1735 1740

Val Ile Glu Val Thr Asn Lys Ala Glu Lys Lys Gly Asn Val Gln Val
 1745 1750 1755 1760

Thr Asn Lys Thr Glu Lys Thr Thr Lys Val Asp Lys Asn Asn Lys Val
 1765 1770 1775

Pro Lys Lys Arg Arg Thr Gln Lys Ser Lys
 1780 1785

<210> 9

<211> 630

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Polypeptide

<400> 9

Thr Leu Thr Glu Ser Val Asp Asp Asn Lys Asn Leu Glu Glu Ala Glu
 1 5 10 15

Asp Ile Lys Glu Asn Ile Leu Leu Ser Asn Ile Glu Glu Pro Lys Glu
 20 25 30

Asn Ile Ile Asp Asn Leu Leu Asn Asn Ile Gly Gln Asn Ser Glu Lys
 35 40 45

Gln Glu Ser Val Ser Glu Asn Val Gln Val Ser Asp Glu Leu Phe Asn
 50 55 60

Glu Leu Leu Asn Ser Val Asp Val Asn Gly Glu Val Lys Glu Asn Ile
 65 70 75 80

Leu Glu Glu Ser Gln Val Asn Asp Asp Ile Phe Asn Ser Leu Val Lys
85 90 95

Ser Val Gln Gln Glu Gln Gln His Asn Val Glu Glu Lys Val Glu Glu
100 105 110

Ser Val Glu Glu Asn Asp Glu Glu Ser Val Glu Glu Asn Val Glu Glu
115 120 125

Asn Val Glu Glu Asn Asp Asp Gly Ser Val Ala Ser Ser Val Glu Glu
130 135 140

Ser Ile Ala Ser Ser Val Asp Glu Ser Ile Asp Ser Ser Ile Glu Glu
145 150 155 160

Asn Val Ala Pro Thr Val Glu Glu Ile Val Ala Pro Thr Val Glu Glu
165 170 175

Ile Val Ala Pro Ser Val Val Glu Ser Val Ala Pro Ser Val Glu Glu
180 185 190

Ser Val Ala Pro Ser Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu
195 200 205

Ser Val Ala Glu Asn Val Glu Glu Ile Val Ala Pro Ser Val Glu Glu
210 215 220

Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu
225 230 235 240

Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu
245 250 255

Ser Val Ala Glu Asn Val Glu Glu Ile Val Ala Pro Thr Val Glu Glu
260 265 270

Ser Val Ala Pro Thr Val Glu Glu Ile Val Ala Pro Thr Val Glu Glu
275 280 285

Ser Val Ala Pro Thr Val Glu Glu Ile Val Val Pro Ser Val Glu Glu
290 295 300

Ser Val Ala Pro Ser Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu
305 310 315 320

Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu
325 330 335

Ser Val Ala Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu

| | | | |
|---|-----|-----|-----|
| Ile Val Ala Pro Ser Val Glu Glu Ile Val Ala Pro Thr Val Glu Glu | 340 | 345 | 350 |
| 355 | 360 | 365 | |
| Ser Val Ala Glu Asn Val Ala Thr Asn Leu Ser Asp Asn Leu Leu Ser | 370 | 375 | 380 |
| Asn Leu Leu Gly Gly Ile Glu Thr Glu Glu Ile Lys Asp Ser Ile Leu | 385 | 390 | 395 |
| 400 | | | |
| Asn Glu Ile Glu Glu Val Lys Glu Asn Val Val Thr Thr Ile Leu Glu | 405 | 410 | 415 |
| Lys Val Glu Glu Thr Thr Ala Glu Ser Val Thr Thr Phe Ser Asn Ile | 420 | 425 | 430 |
| Leu Glu Glu Ile Gln Glu Asn Thr Ile Thr Asn Asp Thr Ile Glu Glu | 435 | 440 | 445 |
| Lys Leu Glu Glu Leu His Glu Asn Val Leu Ser Ala Ala Leu Glu Asn | 450 | 455 | 460 |
| Thr Gln Ser Glu Glu Glu Lys Lys Glu Val Ile Asp Val Ile Glu Glu | 465 | 470 | 475 |
| 480 | | | |
| Val Lys Glu Glu Val Ala Thr Thr Leu Ile Glu Thr Val Glu Gln Ala | 485 | 490 | 495 |
| Glu Glu Glu Ser Glu Ser Thr Ile Thr Glu Ile Phe Glu Asn Leu Glu | 500 | 505 | 510 |
| Glu Asn Ala Val Glu Ser Asn Glu Lys Val Ala Glu Asn Leu Glu Lys | 515 | 520 | 525 |
| Leu Asn Glu Thr Val Phe Asn Thr Val Leu Asp Lys Val Glu Glu Thr | 530 | 535 | 540 |
| Val Glu Ile Ser Gly Glu Ser Leu Glu Asn Asn Glu Met Asp Lys Ala | 545 | 550 | 555 |
| 560 | | | |
| Phe Phe Ser Glu Ile Phe Asp Asn Val Lys Gly Ile Gln Glu Asn Leu | 565 | 570 | 575 |
| Leu Thr Gly Met Phe Arg Ser Ile Glu Thr Ser Ile Val Ile Gln Ser | 580 | 585 | 590 |
| Glu Glu Lys Val Asp Leu Asn Glu Asn Val Val Ser Ser Ile Leu Asp | 595 | 600 | 605 |

Asn Ile Glu Asn Met Lys Glu Gly Leu Leu Asn Lys Leu Glu Asn Ile
 610 615 620

Ser Ser Thr Glu Gly Glu
 625 630

<210> 10
 <211> 50
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence:Polypeptide

<400> 10
 Arg Asp Glu Leu Phe Asn Glu Leu Leu Asn Ser Val Asp Val Asn Gly
 1 5 10 15
 Glu Val Lys Glu Asn Ile Leu Glu Glu Ser Gln Val Asn Asp Asp Ile
 20 25 30
 Phe Asn Ser Leu Val Lys Ser Val Gln Gln Glu Gln Gln His Asn Val
 35 40 45
 Glu Glu
 50

<210> 11
 <211> 100
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence:Polypeptide

<400> 11
 Val Glu Glu Ser Val Glu Glu Asn Asp Glu Glu Ser Val Glu Glu Asn
 1 5 10 15
 Val Glu Glu Asn Val Glu Asn Asn Asp Asp Gly Ser Val Ala Ser Ser
 20 25 30
 Val Glu Glu Ser Ile Ala Ser Ser Val Asp Glu Ser Ile Asp Ser Ser
 35 40 45
 Ile Glu Glu Asn Val Ala Pro Thr Val Glu Glu Ile Val Ala Pro Thr
 50 55 60

Val Glu Glu Ile Val Ala Pro Ser Val Val Glu Lys Cys Ala Pro Ser
65- 70 75 80

Val Glu Glu Ser Val Ala Pro Ser Val Glu Glu Ser Val Ala Glu Met
85 90 95

Leu Lys Glu Arg
100

<210> 12
<211> 47
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:Polypeptide

<400> 12
Arg Asp Glu Leu Phe Asn Glu Leu Leu Asn Ser Val Asp Val Asn Gly
1 5 10 15
Glu Val Lys Glu Asn Ile Leu Glu Glu Ser Gln Val Asn Asp Asp Ile
20 25 30
Phe Asn Ser Leu Val Lys Ser Val Gln Gln Glu Gln Gln His Asn
35 40 45

<210> 13
<211> 26
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:Polypeptide

<400> 13
Asp Glu Leu Phe Asn Glu Leu Leu Asn Ser Val Asp Val Asn Gly Glu
1 5 10 15

Val Lys Glu Asn Ile Leu Glu Glu Ser Gln
20 25

<210> 14
<211> 27
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:Polypeptide

<400> 14
Leu Glu Glu Ser Gln Val Asn Asp Asp Ile Phe Ser Asn Ser Leu Val
1 5 10 15
Lys Ser Val Gln Gln Glu Gln Gln His Asn Val
20 25

<210> 15
<211> 28
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:Polypeptide

<400> 15
Val Glu Ser Val Ala Pro Ser Val Glu Glu Ser Val Ala Pro Ser Val
1 5 10 15
Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser Val
20 25

<210> 16
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:Polypeptide

<400> 16
Leu Leu Ser Asn Ile Glu Glu Pro Lys Glu Asn Ile Ile Asp Asn Leu
1 5 10 15
Leu Asn Asn Ile
20

<210> 17
<211> 4
<212> PRT
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Polypeptide

<400> 17

Val Glu Glu Ser

1

<210> 18

<211> 4

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Polypeptide

<400> 18

Val Glu Glu Asn

1

<210> 19

<211> 4

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Polypeptide

<400> 19

Val Glu Glu Ile

1

<210> 20

<211> 4

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Polypeptide

<400> 20

Val Ala Pro Ser

1

<210> 21

<211> 56

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Polypeptide

<400> 21

Val Glu Glu Lys Val Glu Glu Ser Val Glu Glu Asn Asp Glu Glu Ser
1 5 10 15

Val Glu Glu Asn Val Glu Glu Asn Val Glu Glu Asn Asp Asp Gly Ser
20 25 30

Val Ala Ser Ser Val Glu Glu Ser Ile Ala Ser Ser Val Asp Glu Ser
35 40 45

Ile Asp Ser Ser Ile Glu Glu Asn
50 55

<210> 22

<211> 540

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Polypeptide

<400> 22

Val Ala Pro Thr Val Glu Glu Ile Val Ala Pro Ser Val Val Glu Ser
1 5 10 15

Val Ala Pro Ser Val Glu Glu Ser Val Glu Glu Asn Val Glu Glu Ser
20 25 30

Val Ala Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser
35 40 45

Val Ala Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ile
50 55 60

Val Ala Pro Thr Val Glu Glu Ile Val Ala Pro Thr Val Glu Glu Ile
65 70 75 80

Val Ala Pro Ser Val Val Glu Ser Val Ala Pro Ser Val Glu Glu Ser
85 90 95

Val Glu Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser
100 105 110

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Ala | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ser |
| | | 115 | | | | | 120 | | | | | | 125 | | |
| Val | Ala | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ile |
| | | 130 | | | | 135 | | | | | 140 | | | | |
| Val | Ala | Pro | Thr | Val | Glu | Glu | Ile | Val | Ala | Pro | Thr | Val | Glu | Glu | Ile |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Val | Ala | Pro | Ser | Val | Val | Glu | Ser | Val | Ala | Pro | Ser | Val | Glu | Glu | Ser |
| | | | | 165 | | | | | 170 | | | | | 175 | |
| Val | Glu | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ser |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Val | Ala | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ser |
| | | 195 | | | | | 200 | | | | | 205 | | | |
| Val | Ala | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ser |
| | | 210 | | | | 215 | | | | | 220 | | | | |
| Val | Ala | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ile |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 |
| Val | Ala | Pro | Thr | Val | Glu | Glu | Ile | Val | Ala | Pro | Thr | Val | Glu | Glu | Ile |
| | | | | 245 | | | | | 250 | | | | | 255 | |
| Val | Ala | Pro | Ser | Val | Val | Glu | Ser | Val | Ala | Pro | Ser | Val | Glu | Glu | Ser |
| | | | 260 | | | | | 265 | | | | | 270 | | |
| Val | Glu | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ser |
| | | 275 | | | | | 280 | | | | | 285 | | | |
| Val | Ala | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ser |
| | | 290 | | | | 295 | | | | | | 300 | | | |
| Val | Ala | Glu | Asn | Val | Glu | Glu | Ile | Val | Ala | Pro | Thr | Val | Glu | Glu | Ile |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 |
| Val | Ala | Pro | Thr | Val | Glu | Glu | Ile | Val | Ala | Pro | Ser | Val | Val | Glu | Ser |
| | | | | 325 | | | | | 330 | | | | | 335 | |
| Val | Ala | Pro | Ser | Val | Glu | Glu | Ser | Val | Glu | Glu | Asn | Val | Glu | Glu | Ser |
| | | | 340 | | | | | 345 | | | | | 350 | | |
| Val | Ala | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ser |
| | | 355 | | | | | 360 | | | | | 365 | | | |
| Val | Ala | Glu | Asn | Val | Glu | Glu | Ile | Val | Ala | Pro | Thr | Val | Glu | Glu | Ile |

370

375

380

Val Ala Pro Thr Val Glu Glu Ile Val Ala Pro Ser Val Val Glu Ser
385 390 395 400

Val Ala Pro Ser Val Glu Glu Ser Val Glu Glu Asn Val Glu Glu Ser
405 410 415

Val Ala Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser
420 425 430

Val Ala Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ile
435 440 445

Val Ala Pro Thr Val Glu Glu Ile Val Ala Pro Thr Val Glu Glu Ile
450 455 460

Val Ala Pro Ser Val Val Glu Ser Val Ala Pro Ser Val Glu Glu Ser
465 470 475 480

Val Glu Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser
485 490 495

Val Ala Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser
500 505 510

Val Ala Pro Thr Val Glu Glu Ile Val Ala Pro Ser Val Glu Glu Ser
515 520 525

Val Ala Pro Ser Val Glu Glu Ser Val Ala Glu Asn
530 535 540

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<211> 39

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<213> Artificial Sequence

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<223> Description of Artificial Sequence: Polypeptide

<400> 23

Asp Glu Asp Ile Glu Glu Asp Val Glu Glu Asp Ile Glu Glu Asp Ile
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Glu Glu Asp Lys Val Glu Asp Ile Asp Glu Asp Ile Asp Glu Asp Ile
20 25 30

Gly Glu Asp Lys Asp Glu Val
35

<210> 24

<211> 56

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence:Polypeptide

<400> 24

Val Glu Glu Lys Val Glu Glu Ser Val Glu Glu Asn Asp Glu Glu Ser
1 5 10 15

Val Glu Glu Asn Val Glu Glu Asn Val Glu Glu Asn Asp Asp Gly Ser
20 25 30

Val Ala Ser Ser Val Glu Glu Ser Ile Ala Ser Ser Val Asp Glu Ser
35 40 45

Ile Asp Ser Ser Ile Glu Glu Asn
50 55

<210> 25

<211> 212

<212> PRT

<213> Artificial Sequence

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Val Ala Pro Thr Val Glu Glu Ile Val Ala Pro Thr Val Glu Glu Ile
1 5 10 15

Val Ala Pro Ser Val Val Glu Ser Val Ala Pro Ser Val Glu Glu Ser
20 25 30

Val Ala Pro Ser Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser
35 40 45

Val Ala Glu Asn Val Glu Glu Ile Val Ala Pro Ser Val Glu Glu Ser
50 55 60

Val Ala Glu Asn Val Glu Glu Ser Val Ala Glu Asn Val Glu Glu Ser
65 70 75 80

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Ala | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ser |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Val | Ala | Glu | Asn | Val | Glu | Glu | Ile | Val | Ala | Pro | Thr | Val | Glu | Glu | Ser |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Val | Ala | Pro | Thr | Val | Glu | Glu | Ile | Val | Ala | Pro | Thr | Val | Glu | Glu | Ser |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Val | Ala | Pro | Thr | Val | Glu | Glu | Ile | Val | Val | Pro | Ser | Val | Glu | Glu | Ser |
| | | 130 | | | | 135 | | | | | 140 | | | | |
| Val | Ala | Pro | Ser | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ser |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Val | Ala | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ser |
| | | | 165 | | | | | | 170 | | | | | 175 | |
| Val | Ala | Glu | Asn | Val | Glu | Glu | Ser | Val | Ala | Glu | Asn | Val | Glu | Glu | Ile |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Val | Ala | Pro | Ser | Val | Glu | Glu | Ile | Val | Ala | Pro | Thr | Val | Glu | Glu | Ser |
| | | 195 | | | | | 200 | | | | | 205 | | | |
| Val | Ala | Glu | Asn | | | | | | | | | | | | |
| 210 | | | | | | | | | | | | | | | |

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<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Polypeptide

<400> 26

Val Val Glu Ser

1

<210> 27

<211> 4

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Polypeptide

<400> 27

Val Ala Glu Asn

1

<210> 28

<211> 4

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:Polypeptide

<400> 28

Val Ala Pro Thr

<210> 29

<211> 4

<212> PRT

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<223> Description of Artificial Sequence:Polypeptide

<400> 19

Val Val Pro Ser

1